# Aircraft and Avionics Equipment Mechanics and Service Technicians

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### Significant Points

- The majority of these workers learn their job in 1 of about 200 trade schools certified by the Federal Aviation Administration.
- Opportunities should be excellent, but competition is likely for the best paying airline jobs.

**Nature of the Work**

To keep aircraft in peak operating condition, aircraft and avionics equipment mechanics and service technicians perform scheduled maintenance, make repairs, and complete inspections required by the Federal Aviation Administration (FAA).

Many aircraft mechanics, also called airframe, powerplant, and avionics aviation maintenance technicians, specialize in preventive maintenance. They inspect engines, landing gear, instruments, pressurized sections, accessories—brakes, valves, pumps, and air-conditioning systems, for example—and other parts of the aircraft, and do the necessary maintenance and replacement of parts. Inspections take place following a schedule based on the number of hours the aircraft has flown, calendar days since the last inspection, cycles of operation, or a combination of these factors. Large, sophisticated planes are equipped with aircraft monitoring systems, consisting of electronic boxes and consoles that monitor the aircraft's basic operations and provide valuable diagnostic information to the mechanic. To examine an engine, aircraft mechanics work through specially designed openings while standing on ladders or scaffolds, or use hoists or lifts to remove the entire engine from the craft. After taking an engine apart, mechanics use precision instruments to measure parts for wear and use x-ray and magnetic inspection equipment to check for invisible cracks. Worn or defective parts are repaired or replaced. Mechanics may also repair sheet metal or composite surfaces, measure the tension of control cables, and check for corrosion, distortion, and cracks in the fuselage, wings, and tail. After completing all repairs, they must test the equipment to ensure that it works properly.

Mechanics specializing in repairwork rely on the pilot's description of a problem to find and fix faulty equipment. For example, during a preflight check, a pilot may discover that the aircraft's fuel gauge does not work. To solve the problem, mechanics may troubleshoot the electrical system, using electrical test equipment to make sure that no wires are broken or shorted out, and replace any defective electrical or electronic components. Mechanics work as fast as safety permits so that the aircraft can be put back into service quickly.

Some mechanics work on one or many different types of aircraft, such as jets, propeller-driven airplanes, and helicopters. Others specialize in one section of a particular type of aircraft, such as the engine, hydraulics, or electrical system. *Powerplant mechanics* are authorized to work on engines and do limited work on propellers. *Airframe mechanics* are authorized to work on any part of the aircraft except the instruments, powerplants, and propellers. *Combination airframe-and-powerplant mechanics*—called A & P mechanics—work on all parts of the plane, except instruments. The majority of mechanics working on civilian aircraft today are A & P mechanics. In small, independent repair shops, mechanics usually inspect and repair many different types of aircraft.

Avionics systems are now an integral part of aircraft design and have vastly increased aircraft capability. *Avionics technicians* repair and maintain components used for aircraft navigation and radio communications, weather radar systems, and other instruments and computers that control flight, engine, and other primary functions. These duties may require additional licenses, such as a radiotelephone license issued by the U.S. Federal Communications Commission (FCC). Because of technological advances, an increasing amount of time is spent repairing electronic systems, such as computerized controls. Technicians also may be required to analyze and develop solutions to complex electronic problems.

**Working Conditions**

Mechanics usually work in hangars or in other indoor areas, although they can work outdoors—sometimes in unpleasant weather—when hangars are full or when repairs must be made quickly. Mechanics often work under time pressure to maintain flight schedules or, in general aviation, to keep from inconveniencing customers. At the same time, mechanics have a tremendous responsibility to maintain safety standards, and this can cause the job to be stressful.

Frequently, mechanics must lift or pull objects weighing as much as 70 pounds. They often stand, lie, or kneel in awkward positions and occasionally must work in precarious positions on scaffolds or ladders. Noise and vibration are common when engines are being


*Aircraft mechanics and service technicians inspect, maintain, and repair airplanes in accordance with Federal Aviation Administration regulations.*

tested, so ear protection is necessary. Aircraft mechanics usually work 40 hours a week on 8-hour shifts around the clock. Overtime work is frequent.

**Employment**

Aircraft and avionics equipment mechanics and service technicians held about 154,000 jobs in 2002; about 1 in 6 of these workers was an avionics technician. Nearly 40 percent of aircraft and avionics equipment mechanics and technicians worked for air transportation companies and close to 20 percent worked for private maintenance and repair facilities. About 20 percent worked for the Federal Government, and about 13 percent worked for aerospace products and parts manufacturing firms. Most of the rest worked for companies that operate their own planes to transport executives and cargo. Few mechanics and technicians were self-employed.

Most airline mechanics and service technicians work at major airports near large cities. Civilian mechanics employed by the U.S. Armed Forces work at military installations. Large proportions of mechanics who work for aerospace manufacturing firms are located in California or in Washington State. Others work for the FAA, many at the facilities in Oklahoma City, Atlantic City, Wichita, or Washington, DC. Mechanics for independent repair shops work at airports in every part of the country.

**Training, Other Qualifications, and Advancement**

The majority of mechanics who work on civilian aircraft are certificated by the FAA as "airframe mechanic," "powerplant mechanic," or "avionics repair specialist." Mechanics who also have an inspector's authorization can certify work completed by other mechanics and perform required inspections. Uncertificated mechanics are supervised by those with certificates.

The FAA requires at least 18 months of work experience for an airframe, powerplant, or avionics repairer's certificate. For a combined A & P certificate, at least 30 months of experience working with both engines and airframes is required. Completion of a program at an FAA-certified mechanic school can substitute for the work experience requirement. Applicants for all certificates also must pass written and oral tests and demonstrate that they can do the work authorized by the certificate. To obtain an inspector's authorization, a mechanic must have held an A & P certificate for at least 3 years. Most airlines require that mechanics have a high school diploma and an A & P certificate.

Although a few people become mechanics through on-the-job training, most learn their job in 1 of about 200 trade schools certified by the FAA. About one-third of these schools award 2- and 4-year degrees in avionics, aviation technology, or aviation maintenance management.

FAA standards established by law require that certified mechanic schools offer students a minimum of 1,900 actual class hours. Coursework in these trade schools normally lasts from 24 to 30 months and provides training with the tools and equipment used on the job. Aircraft trade schools are placing more emphasis on technologies such as turbine engines, composite materials—including graphite, fiberglass, and boron—and aviation electronics, which are increasingly being used in the construction of new aircraft. Additionally, employers prefer mechanics who can perform a variety of tasks.

Some aircraft mechanics in the Armed Forces acquire enough general experience to satisfy the work experience requirements for the FAA certificate. With additional study, they may pass the certifying exam. In general, however, jobs in the military services are too specialized to provide the broad experience required by the FAA. Most Armed Forces mechanics have to complete the entire training program at a trade school, although a few receive some credit for the material they learned in the service. In any case, military experience is a great advantage when seeking employment; employers consider trade school graduates who have this experience to be the most desirable applicants.

Courses in mathematics, physics, chemistry, electronics, computer science, and mechanical drawing are helpful, because they demonstrate many of the principles involved in the operation of aircraft, and knowledge of these principles is often necessary to make repairs. Courses that develop writing skills also are important because mechanics are often required to submit reports.

FAA regulations require current experience to keep the A & P certificate valid. Applicants must have at least 1,000 hours of work experience in the previous 24 months or take a refresher course. As new and more complex aircraft are designed, more employers are requiring mechanics to take ongoing training to update their skills. Recent technological advances in aircraft maintenance necessitate a strong background in electronics—both for acquiring and retaining jobs in this field. FAA certification standards also make ongoing training mandatory. Every 24 months, mechanics are required to take at least 16 hours of training to keep their certificate. Many mechanics take courses offered by manufacturers or employers, usually through outside contractors.

Aircraft mechanics must do careful and thorough work that requires a high degree of mechanical aptitude. Employers seek applicants who are self-motivated, hard-working, enthusiastic, and able to diagnose and solve complex mechanical problems. Agility is important for the reaching and climbing necessary to do the job. Because they may work on the tops of wings and fuselages on large jet planes, aircraft mechanics must not be afraid of heights.

As aircraft mechanics gain experience, they may advance to lead mechanic (or crew chief), inspector, lead inspector, or shop supervisor positions. Opportunities are best for those who have an aircraft inspector's authorization. In the airlines, where promotion often is determined by examination, supervisors sometimes advance to executive positions. Those with broad experience in maintenance and overhaul might become inspectors with the FAA. With additional business and management training, some open their own aircraft maintenance facilities. Mechanics learn many different skills in their training that can be applied to other jobs, and some transfer to other skilled repairer occupations or electronics technician jobs.

**Job Outlook**

Opportunities for aircraft and avionics equipment mechanics and service technician jobs should be excellent for persons who have completed aircraft mechanic training programs. Employment of aircraft mechanics is expected to increase about as fast as the average for all occupations through the year 2012, and large numbers of additional job openings should arise from the need to replace experienced mechanics who retire. Avionics technicians are projected to increase at a slower than average rate. Despite the long-term forecast, these occupations are currently in a period of little to no growth. Reduced passenger traffic resulting from a weak economy and the events of September 11, 2001, have forced airlines to cut back flights and take aircraft out of service. As the economy improves and public reluctance to board aircraft decreases, a growing population should increase passenger traffic and create the need for more aircraft mechanics and service technicians over the next decade. If the number of graduates from aircraft mechanic training programs continues to fall short of employer needs, opportunities for graduates of mechanic training programs should be excellent.

Most job openings for aircraft mechanics through the year 2012 will stem from replacement needs. A large number of mechanics

are expected to retire over the next decade and create several thousand job openings per year. In addition, others will leave to work in related fields, such as automobile repair, as much of their skills are transferable to other maintenance and repair occupations. Also contributing to favorable future job opportunities for mechanics is the long-term trend towards fewer students entering technical schools to learn skilled maintenance and repair trades. Many of the students who have the ability and aptitude to work on planes are choosing to go to college, work in computer-related fields, or go into other repair and maintenance occupations with better working conditions. If the trend continues, the supply of trained aviation mechanics will not be able to keep up with air transportation industry needs when growth resumes in the industry.

Job opportunities are likely to be the best at small commuter and regional airlines, at FAA repair stations, and in general aviation. Commuter and regional airlines are the fastest growing segment of the air transportation industry, but wages in these companies tend to be lower than those in the major airlines, so they attract fewer job applicants. Also, some jobs will become available as experienced mechanics leave for higher paying jobs with the major airlines or transfer to another occupation. At the same time, general aviation aircraft are becoming increasingly sophisticated, boosting the demand for qualified mechanics. Mechanics will face more competition for jobs with large airlines because the high wages and travel benefits that these jobs offer generally attract more qualified applicants than there are openings. In spite of this, job opportunities with the airlines are expected to be better than they have been in the past. But, in general, prospects will be best for applicants with experience. Mechanics who keep abreast of technological advances in electronics, composite materials, and other areas will be in greatest demand. The number of job openings for aircraft mechanics in the Federal Government should decline as the government increasingly contracts out service and repair functions to private repair companies.

**Earnings**

Median hourly earnings of aircraft mechanics and service technicians were about $20.71 in 2002. The middle 50 percent earned between $16.94 and $25.23. The lowest 10 percent earned less than $13.16, and the highest 10 percent earned more than $28.92. Median hourly earnings in the industries employing the largest numbers of aircraft mechanics and service technicians in 2002 were:

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| Air transportation, scheduled | $23.48 |
| Federal Government | 20.59 |
| Air transportation, nonscheduled | 19.84 |
| Aerospace product and parts manufacturing | 19.68 |
| Support activities for air transportation | 17.64 |

Median hourly earnings of avionics technicians were about $20.21 in 2002. The middle 50 percent earned between $17.44 and $23.91. The lowest 10 percent earned less than $14.01, and the highest 10 percent earned more than $27.00.

Mechanics who work on jets for the major airlines generally earn more than those working on other aircraft. Airline mechanics and their immediate families receive reduced-fare transportation on their own and most other airlines.

Almost 4 in 10 aircraft and avionics equipment mechanics and service technicians are members of or covered by union agreements. The principal unions are the International Association of Machinists and Aerospace Workers and the Transport Workers Union of America. Some mechanics are represented by the International Brotherhood of Teamsters.

**Related Occupations**

Workers in some other occupations that involve similar mechanical and electrical work are electricians, electrical and electronics installers and repairers, and elevator installers and repairers.

**Sources of Additional Information**

Information about jobs with a particular airline can be obtained by writing to the personnel manager of the company.

For general information about aircraft and avionics equipment mechanics and service technicians, write to:

➤ Professional Aviation Maintenance Association, 717 Princess St., Alexandria, VA 22314. Internet: **http://www.pama.org**

For information on jobs in a particular area, contact employers at local airports or local offices of the State employment service.